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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/750,007	12/27/2000	Masaki Hara	09792909-4737	6600

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EXAMINER

CHU, KIM KWOK

ART UNIT	PAPER NUMBER
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2653

DATE MAILED: 08/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/750,007

Applicant(s)

HARA ET AL.

Examiner

Kim-Kwok CHU

Art Unit

2653

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-12 and 14 is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☒ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

Claim Objections

1. Claim 13 is objected to because of the following informalities:

(a) in claim 13, line 1, the term "the plasma CVD process" should be changed to --a plasma CVD process--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 2 and 3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

(a) as in claims 2 and 3, both terms "SiNx" is not clear because the chemical symbol "Nx" is unknown.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

*A person shall be entitled to a patent unless --
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.*

5. Claims 1-3 are rejected under 35 U.S.C. § 102(b) as being anticipated by Maynard (U.S. Patent 5,872,880).

Maynard teaches a micro mirror unit 200 having all of the elements and means as recited in claims 1-3. For example, Maynard teaches the following:

(a) as in claim 1, the mirror unit 200 including a frame 303 and a mirror substrate 100, formed from a single substrate material (Figs. 1 and 3; column 6, lines 66-67; column 7, lines 1-20);

(b) as in claim 1, the mirror body 207B having a mirror surface formed on the mirror substrate being linked to the frame 303 by means of hinge 402 in such a manner that the mirror body is supported movably in relation to the frame (Figs. 3 and 4, the hinge 402 is the cantilever hinge; column 6, lines 49-55);

(c) as in claim 1, the hinges 402 of the micro mirror unit being formed from a different material from that from which the frame and mirror body are formed (Fig. 4; column 6, lines 35-42);

(d) as in claim 2, the hinge 402 are formed from silicon nitride (Fig. 4; column 7, lines 8-10); and

(e) as in claim 3, the hinge 402 are formed from a composite material of silicon nitride having a metallic material 405 laminated thereon (Fig. 4; the hinge is electrically driven by conductor material 405; column 6; lines 49-62; column 13, lines 38-41).

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

*A person shall be entitled to a patent unless -
(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.*

7. Claims 8 and 9 are rejected under 35 U.S.C. § 102(e) as being anticipated by Heanue et al. (U.S. Patent 6,212,151).

Heanue teaches an optical disc drive in which a light is directed from a light source to an optical disc to write and/or read information to and/or from the optical disc having all of the elements and means as recited in claims 8 and 9. For example, Heanue teaches the following:

(a) as in claim 8, a micro mirror unit 373 to reflect an incident light from the light source 131 towards the optical disc

549 (Figs. 1 and 3e; column 1, lines 57-59; column 6, lines 50-65);

(b) as in claim 8, the micro mirror unit 373 including a frame 31 and 51 and a mirror substrate, formed from a single substrate material (Fig. 3e; frame is the mirror support 31 and 51; mirror is formed from a substrate such as silicon material);

(c) as in claim 8, a mirror body consisting of the mirror substrate and a mirror surface formed on the substrate being linked to the frame 31 and 51 by means of hinges 10 and 11 formed from a different material from that of the frame and mirror substrate, and thus supported movably in relation to the frame (Fig. 3e);

(d) as in claim 8, the position of the light incident upon the optical disc being changed by moving the mirror body (Figs. 1 and 2); and

(e) as in claim 9, the micro mirror unit is provided on a floating slider which is levitated over the optical disc (Fig. 9).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Maynard (U.S. Patent 5,872,880) in view of Yao (U.S. Patent 5,578,976).

Maynard teaches a micro mirror unit very similar to the instant invention. For example, Maynard teaches the hinge 402 is formed from a composite material having a metallic material. However, Maynard does not teach the following:

(a) as in claims 4 and 5, the hinge is formed from SiO₂.

Yao teaches a silicon dioxide cantilever having a SiO₂ as an insulation layer (column 8, lines 29-31).

To prevent electric current leaking out the hinge, it would have been obvious to one of ordinary skill in the art to form Maynard's silicon hinge with a silicon dioxide material such as Yao's, because the silicon dioxide acts as an insulator to the

hinge's metallic conducting material having currents as its driving force.

10. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Maynard (U.S. Patent 5,872,880) in view of Madono et al. (U.S. Patent 5,229,193).

Maynard teaches a micro mirror unit very similar to the instant invention. For example, Maynard teaches the hinge 402 is formed from a composite material having a metallic material.

However, Maynard does not teach the following:

(a) as in claims 6 and 7, the hinge is formed from SiC.

Madono teaches a silicon carbide member (Figs. 1-3).

To prevent mechanical damages such as cracking separate the hinge from the frame, it would have been obvious to one of ordinary skill in the art to coat Maynard's silicon hinge with a carbide layer such as Madono's, because the carbide coating minimizes differential thermal expansion between the frame and the hinge.

Allowable Subject Matter

11. Claims 10-14 are allowable over prior art.

12. The following is an Examiner's statement of reasons for the indication of allowable subject matter:

As in claim 10, the prior art of record fails to teach or fairly suggest a method of producing a micro mirror having the following steps:

(a) a first step at which a material for the hinges are formed as layer on one main side of a substrate material for the frame and mirror substrate;

(b) a second step at which a resist layer is formed on the other main side of the substrate material on which a mirror surface is formed; and

(c) a third step at which the frame and mirror substrate are separated from each other by the dry etching using the resist layer as a mask.

The features indicated above, in combination with the other elements of the claims, are not anticipated by, nor made obvious

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Swart et al. (6,025,951) is pertinent because Swart teaches a micro-fabricated optical mirror.

Atobe et al. (5,999,306) is pertinent because Atobe teaches a light modulator fabrication process.

Lee et al. (5,532,884) is pertinent because Lee teaches an optical disc apparatus having a rotating mirror for reflecting a light beam.

Baker et al. (5,454,906) is pertinent because Baker teaches a micro-fabricated optical mirror.

Aine (4,600,934) is pertinent because Aine teaches a cantilever having a SiO₂ material as an insulator.

14. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks Washington, D.C.
20231 Or faxed to:

(703) 872-9306 (for formal communications intended for
entry. Or:

(703) 746-6909, (for informal or draft communications,
please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park
II, 2021 Crystal Drive, Arlington. VA., Sixth Floor
(Receptionist).

Any inquiry of a general nature or relating to the status of
this application should be directed to the Group receptionist
whose telephone number is (703) 305-4700.

Any inquiry concerning this communication or earlier
communications from the examiner should be directed to Kim CHU
whose telephone number is (703) 305-3032.

ke 8/4/04

Kim-kwok CHU
Examiner AU2653
August 4, 2004

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A. J. HEINZ
PRIMARY EXAMINER
GROUP ~~2500~~ 2653

A. J. Heinz